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ABSTRACT

Described is the Quick Neurological Screening Test (QNST), a measure of "soft" neurological signs frequently associated with learning disabilities, and discussed are research findings on the QNST. The QNST is said to provide classroom teachers with a method for identifying children whose learning disabilities are caused by neurological insufficiency. Results are reported for studies on the validity, reliability, and predictive validity of the QNST. (CL)

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RESEARCH WITH QNST: A REVIEW

A Paper Presented

to

The International Federation of Learning Disabilities

by

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QNST stands for Quick Neurological Screening Test, a test which was developed in the California Bay Area in an attempt to provide classroom teachers with a means of identifying those children in their classrooms who have learning disabilities caused by neurological insufficiency. The test was adapted from a typical pediatric neurological examination by its authors, Harold Sterling, M.D., Professor of Physical Medicine and Rehabilitation and Pediatrics, University of California, Davis; Mrs. Margaret Mutti, Educational Psychologist and Learning Disabilities Therapist from Lafayette, California; Father Slade Crawford formerly Dean of Guidance and Counseling from St. Mary's High School, Berkeley, California; and myself, Assistant Professor of Special Education, Learning Disabilities Specialist from San Jose State University, San Jose, California. It was recently published in an experimental edition by Academic Therapy Publications, San Rafael, California, for use by teachers, psychologists, and Learning Disabilities Specialists. It has been widely disseminated and is now being used in more than 2000 schools in the United States, with over 100,000 persons having been

tested. We have found it to be useful with both children and adults. The QNST is still under development. We welcome comments and communications about its usefulness and criticisms which will help us to improve its value.

The test was presented to me in November, 1971, when I was looking for a project for my Doctoral Dissertation. At that time it was in clinical form, extremely subjective, without relative weighting for measuring performance of the child. My first task was to devise a system of scoring to obtain an objective measure of a child's performance. Then a computer could be used to evaluate the QNST. The test has had subtests added and deleted, and we intend to revise it again when we publish a new manual next year.

Clements, in 1969 under a grant from the United States Department of Health, Education, and Welfare, defined the term learning disabilities in this way:

> The term 'minimal brain dysfunction syndrome' (commonly called learning disability) refers to children of near average, average, or above average general intelligence with certain learning or behavioral disabilities ranging from mild to severe, which are associated with deviations of function of the central nervous system. These deviations may manifest themselves by various combinations of impairment in perception, conceptualization, language, memory, and control of attention, impulse or motor function.

The Quick Neurological Screening Test is composed of fourteen subtests which measure the integration of the

child's central nervous system. This integration is manifest by "soft" neurological signs. Svirsky (1969) defined the soft signs thus: "Some soft signs are poor balance, involuntary movement, general clumsiness, difference in function between the two sides of the body, deficits in reciprocal, rapidly alternating, or selective movement, and many more. The more signs, the more likely that abnormality is present." The first subtest is called Hand Skill, which measures the ability of the individual to hold and use a pencil in writing his name. The second subtest is called Figure Recognition and Production, which screens for awkwardness in copying five geometric figures. In Subtest Three, the examiner demonstrates agility and balance in rapidly accelerating hand movements and asks the testee to copy these movements. Palm Form Recognition is Subtest Four. This subtest does not differentiate between normal and learning disabled children, but adds length and strength to the test by finding those who fail to follow directions or are inadequate or unready for learning numbers. Subtest Five, called Finger to Nose is a typical neurological test given to measure the subject's sense of position in space. With his eyes closed, the subject is asked to touch his nose and find the examiner's hand which he has located in space. Subtest Six is called

Thumb and Finger Circle. It measures left-right discrimination, symmetry and balance in use of the hands and fingers which is so important to visual motor coordination. Double Simultaneous Stimulation of Hand and Cheek is Subtest Seven. It measures the ability of the individual to discriminate touch. Subtest Eight measures Eye Tracking. Adequate and coordinated eye movement is essential to learning to read. Subtest Nine, called Sound Patterns, screens for auditory-motor integration, the ability to transfer an auditory pattern into a motor pattern. Subtest Ten, sometimes called the Monkey Test, which we call Arm and Leg Extension, seeks to identify tremor and random movement in stretched muscles. Subtest Eleven, Tandem Walk, measures balance and random body movement, and clumsiness in gross motor movements. Subtest Twelve, called Stand and Skip, measures balance and coordinated alternating movement in the feet and legs. Subtest Thirteen is composed of measures of left-right discrimination taken from Subtests Five, Six, and Twelve. Subtest Fourteen asks the examiner to identify Behavioral Irregularities of perseveration, motor disinhibition, and distractibility noted during the administration of the entire test. The QNST is an individually administered test which takes approximately fifteen minutes to give. A typical

class of 30 children can be tested in a very short time. The test is fun for children and is nonthreatening to low-achievers.

Six research studies will be briefly reviewed in this paper. Taken together, these studies demonstrate the effectiveness of the QNST and point to its value for future use in all classrooms where alert teachers are working to aid children with learning difficulties. The test screens children whose problems in school are caused by neurological insufficiencies and points out areas for further investigation and remediation.

The first research study published was a validation of the QNST. As you know, a validation study attempts to point out that a test is measuring what it purports to measure. In this case, learning disabilities. Eighty-eight children were identified as learning disabled from the Learning Disabilities Laboratory Program at San Jose State University. These children, who ranged in age from six to eighteen years of age, had been given a battery of tests which included the Wechsler Intelligence Scale for Children, the Bender-Gestalt Test, the Goodenough-Harris Draw-a-Man Test, the Frostig Developmental Test of Visual Perception, the Illinois Test of Psycholinguistic Abilities, the Peabody Picture Vocabulary Test, the

Templin-Darley Test of Articulation, the Wepman Test of Auditory Discrimination, Hiskey Nebraska Test of Learning Aptitude, Purdue Perceptual Motor Survey and/or the Lincoln-Aseretsky Motor Development Scale as well as reading tests, such as the Durrell Analysis of Reading Difficulty, the Wide Range Achievement Test, and the Gray Oral Reading Test. This battery of tests commonly takes six to eight hours to administer and pinpoints the strengths and weaknesses of children's school performance. The testing is psychoeducational in nature. Every parent participates in a conference with the Learning Disabilities Specialist who goes over the discrepancies between the child's ability as measured by the test and his achievement in school. A program of remediation is devised, with recommendations for the parents and the child's teachers. These eighty-eight learning disabled children were matched with eighty-eight children who were reading at or above grade level from the regular school systems of Santa Clara County on sex, IQ, SES, and Age. All 176 children were tested by two examiners and their total scores were analyzed by the computer. The statistical test used was a Discriminant Analysis which ranks each total score in the array from most normal to most learning disabled. The distribution of scores indicated that this set of scores came from two

populations, normal and learning disabled. The same procedure was performed on three age groups, children below 9 years; children from 9 years 1 month to 11 years 11 months, and children over 12 years. The discriminant analysis indicated that the QNST is most useful for children below 9 years, but that it also discriminates between children in the older age groups effectively. A second statistical test, a multiple linear discriminant analysis, was performed on the subtest data to identify which subtests were most valuable. The analysis indicates that the subtests' effect varies at different ages; however, Figure Recognition and Production, Rapid Hand Movements, Finger to Nose, Eye Tracking, Arm and Leg Extension, Tandem Walk, and Stand and Skip were the most effective subtests.

After researching the validity of the QNST, we sought to measure its reliability. In 1973, Yamahara conducted two research projects which attempted to establish whether the QNST scores remained closely similar in test-retest situations six to eight weeks apart. The first project studied scores when tests were administered by two different examiners. Thirty-three children aged 7 to 15 years from the San Jose State University Learning Disabilities Laboratory were the subjects of the research. A reliability correlation coefficient of .71 was obtained. This

coefficient is considered significant, especially because the number of subtests in the QNST is small, and also because the "soft" signs tend to be variable and fleeting. A typical learning disabled reader "knows" the words one day and remembers nothing the next. The second project by Yamahara computed a test-retest reliability coefficient when thirty-one subjects from the San Jose State University Learning Disabilities Laboratory were examined by the same researcher after a time lapse of six to eight weeks. This time period was chosen as long enough to eliminate the learning effect, and short enough to control for maturation. In this research the correlation coefficient was .81, a highly significant measure of reliability. In Yamahara's research, the most reliable subtests were Figure Recognition and Production, Double Simultaneous Stimulation of Hand and Cheek, and Behavioral Irregularities.

Crawford (1973) used the QNST to test ninth grade pupils at St. Mary's College High School in Berkeley to determine its usefulness as a predictor of success in the secondary school. He correlated QNST scores with twenty-one measures of behavior and achievement such as the Nelson-Denny Reading Test Vocabulary and Comprehension Scores, the Modern Language Aptitude Test, Grade-point Averages and Subtests of the Scholastic Testing Service

20 Test, SES, Sociograms, Acting-Out Behavior, Peer-Group Interaction, and Teacher Evaluations. He found that high scores on the QNST indicating neurological impairment correlated significantly with low grade point averages as well as with measures of social deviance.

Landon (1974) studied the correlation between scores on the Bender Visual Motor Gestalt and the QNST, both brief measures of neurological integration. The tests differ significantly, however, since the Bender must be scored by a certified school psychologist and the QNST can be administered and scored by a classroom teacher. Landon compared the performance of thirty randomly selected kindergarten children, ranging in age from 5 years 4 months to 6 years 3 months on both tests. Using the Koppitz Developmental Scoring System (1964) for the Bender, she found a low but positive correlation of .51 between the total score on the QNST and the Bender, Brain Injury Factors.

In 1974, Geiser researched differences in scores when the QNST was administered by "experts" and classroom teachers. Twenty-four normal and learning disabled children were randomly selected from a pool of twenty-eight children ranging in age from 5 years 10 months to 12 years 6 months. Six children were tested by a regular classroom

teacher and an expert, again randomly in order to control for learning effect. The teachers were on the faculty of a different school from the children and the experts were unknown to the school which the children attended, so that the testing was double-blind. A Spearman Rank Correlation Coefficient was computed on the scores resulting in a correlation of .69 which is significant at the .001 level. Although the scores of the experts tended to be higher than the scores of the teachers, the relative positions in the array were very similar. The teachers had viewed two videotapes demonstrating use of the QNST and read the manual as well as participating in a briefing session where they were permitted to ask questions of the researcher. This research indicates that the QNST is a reliable instrument in the hands of teachers who have been minimally trained in its use.

Other research using the QNST has been completed in 1975. Graf compared the scores of thirty kindergarten children on the QNST with scores on a screening test developed by Silver of New York University Medical School called Search. She found a correlation of .87 between the scores. In her opinion, Search, which takes nearly twice as long to administer as the QNST, is threatening to children who have learning difficulties. She feels that if we have a choice

between two tests, equally good, that the choice should be for the nonthreatening measure, since the learning disabled child has a low self-concept even at this level. My 1975 research with 198 kindergarten children indicates that the QNST is most useful for children more than six years of age, since many of the children have developmental lags which are confused with neurological insufficiencies before age six.

The Quick Neurological Screening Test gives promise of being an extremely valuable tool in the hands of teachers and psychologists interested in aiding children who suffer from learning disabilities. It is quick and easy to administer. It is a screening test, however, and should not be considered an in-depth study of a child's neurological insufficiencies. It points the way to the need for further study of a child. If all children who are having problems in learning could be identified at the earliest possible moment, remediation could be planned and every child become a success.

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